

## SECTION 8000 - MATERIALS TESTING

- 8001 SCOPE. This section shall apply to all required testing services for soils, asphalt and concrete.
- 8002 GENERAL. All materials testing shall be conducted by a testing laboratory qualified and approved by the city to perform the required sampling, analysis, testing and report writing services. Reports shall be prepared by or under the supervision of and bear the seal and signature of a professional engineer licensed in the state of Kansas. Improperly completed or certified reports will not be accepted.
- 8003 RESPONSIBILITIES OF THE CONTRACTOR OR DEVELOPER. The contractor or developer shall provide all the required tests as herein specified at his expense. The contractor shall allow the testing agency access to the job site as may be required and shall furnish any labor as may be required by the testing agency to obtain and handle samples at the source of the material and at the site of the work. Adequate facilities shall be provided at the project site for the safe storage and proper curing of specimens requiring such facilities. The use of a testing agency's service does not relieve the contractor of the responsibility to furnish the required materials and to perform the required construction in full compliance with the city of Gardner technical specifications. The successful passing of a test does not constitute acceptance of the work or materials represented by the test or any portion of the work or materials. Final acceptance of the project shall be granted only through the issuance of a Project Completion Certificate by the city of Gardner and the expiration of the two (2) year maintenance period as established in these specifications.
- 8004 RESPONSIBILITIES OF THE TESTING AGENCY. All testing agencies shall meet the requirements of ASTM E329. A representative shall inspect, sample and test the materials and work as required by the city engineer. Any material furnished or work performed by the contractor failing to conform to the specification requirements shall be immediately brought to the attention of the city engineer and the contractor. Preliminary written field reports of all tests and inspection results shall be given to the contractor immediately after they are performed. A copy of all reports shall be forwarded to the city engineer as they are made available. Results of all tests taken, including failing tests, shall be reported. The testing agency and its representative are not authorized to revoke, alter, relax, enlarge or release any requirement of the specifications, nor to approve or accept any portion of the work.
- 8005 ASPHALT TESTING. Sampling and testing of the asphalt mix shall be required on all asphalt paving projects constructed in the city of Gardner.

Samples of the actual asphalt mix being used on a paving project shall be acquired by a qualified testing laboratory technician at either the construction site or the batching plant per ASTM Standards D979 and D3665. These samples shall be used to perform an aggregate gradation test (ASTM C136), asphalt extraction test (ASTM D2172), stability and flow test (ASTM D1559) and bulk specific gravity test (ASTM D2726). One complete group of tests shall be conducted on both the base material and the surface material for each paving project.

In-place density tests shall be conducted with a nuclear testing device during the course of the work. Density tests shall be performed by the testing laboratory to verify that the performance specifications in Section 1309 *Density and Surface Requirements* of this specifications manual have been achieved. The number of tests to be taken and the locations thereof shall be determined by the inspector based upon his observation of the paving process. A minimum of two (2) tests per 1500 feet of street improvement shall be taken unless otherwise directed by the city engineer. Tests performed with a nuclear device shall be conducted as per the requirements of ASTM D2950.

8006 CONCRETE TESTING. Sampling and testing shall be required on all concrete work including curb and gutter, sidewalk, slope paving, retaining walls, inlets, manholes or any other structures.

During the progress of the work, compression tests of the concrete used shall be made as directed by the engineer in accordance with the requirements of ASTM C31, C143, and C172. At least one sample, consisting of four (4) cylinders minimum, shall be taken from each 100 cubic yards of concrete placed or fraction thereof. In the event that the total amount of concrete on a project does not exceed 200 cubic yards, a minimum of four (4) specimens (consisting of four (4) cylinders each) shall be submitted for the project. In the case of a reinforced concrete box, a minimum of one sample shall be taken for each day's pour. The cylinders shall be cast in the field and transported to the laboratory 24 hours after the concrete was placed. Each set of compression test cylinders shall be marked or tagged with the date and time of day the cylinders were made, the location in the work where the concrete represented by the cylinders taken was placed, the delivery truck or batch number, the air content, and the slump. From each sample consisting of four cylinders, one (1) shall be broken at seven (7) days, one (1) at fourteen (14) days and two (2) at twenty-eight (28) days noting the compressive strength of each break.

Slump tests (ASTM C143) and air tests (ASTM C231) shall be made for each 25 cubic yards of concrete placed or fraction thereof. A minimum of two (2) slump and air tests shall be taken per day. Slump and air tests shall be taken with each cylinder series.

If samples of fresh concrete have not been obtained and tested, a minimum of three (3) cores shall be taken per ASTM C42 and broken as directed by the engineer. Air content (ASTM D457) and cement content (ASTM C85) shall also be determined. Concrete in the portion of the structure from which the core was taken will be considered adequate if the average strength of the cores is equal to a minimum of 95% of the specified strength ( $f'_c$ ) and if the strength of any single core is not less than 80% of  $f'_c$ . All core holes shall be completely filled with a low-slump, high strength concrete at the expense of the contractor.

All reports by testing laboratories shall include the type of structure and information on obtaining, transporting, storing, curing, time between obtaining and casting cylinders (when applicable), supplier, finisher and batch as well as the specific test data.

8007 SOIL TESTING. Sampling and testing shall be required on all subgrade preparation for street construction and all trench backfilling operations within the city of Gardner.

Prior to the contractor commencing subgrade compaction for any street improvement project, the city engineer shall designate the locations and depths at which a qualified technician shall acquire samples of soil for performing a moisture density test (ASTM D698 for cohesive soils and ASTM D2049 for non-cohesive soils). A minimum of one (1) density test and maximum of two (2) density tests shall be performed for every 1000 feet of street construction.

Reports for moisture-density tests shall include the date, the location of the tests, the elevation or depth at which the test was taken, the maximum dry density, and the optimum moisture content as well as properly constructed moisture-density curves for each sample. Also included shall be a determination of the soils plastic index (PI) and liquid limit and classification in accordance with ASTM D2487.

During the progress of the subgrade preparation, in-place density tests shall be performed with a nuclear density tester by a qualified technician approved by the city of Gardner. The number of tests to be taken and the location thereof shall be determined by the inspector based upon his observation of the subgrade preparation. A minimum of two (2) tests per lift per 1500 feet of street improvement shall be taken unless otherwise directed by the city engineer. Results of these tests shall indicate whether or not the performance specifications stated in Section 1205 *Compaction Requirements* of this specification manual have been achieved. If the tests indicate the compaction is not sufficient, the contractor shall increase the compactive effort on all such inadequately compacted areas. Tests performed with a nuclear device shall be conducted as per the requirements of ASTM D2922.

During the progress of the work of trench backfilling, in-place density tests shall be performed with a nuclear density tester by a qualified technician. The number of tests to be taken and the locations thereof shall be determined by the inspector based upon his observation of the backfilling process. A minimum of two (2) tests per 1000 feet of trench shall be taken unless otherwise directed by the city engineer. Results of these tests shall indicate whether or not the performance specifications stated in Section 6018 *Trench Backfill* of this specification manual have been achieved. If the tests indicate the compaction is not sufficient, the contractor shall increase the compactive effort on all such inadequately compacted areas.